REMARKS

In the Office Action dated October 5, 2007, a typographical error in claims 10, 11 and 12 was noted, which as been corrected. The same typographical error occurred in claim 13, and therefore that claim has been corrected as well.

Claims 7-14 were rejected under 35 U.S.C. §102(e) as being anticipated by Zhu et al. This rejection is respectfully traversed for the following reasons.

As explained in pages 1-3 of the present specification, in order to achieve better image quality certain types of magnetic resonance tomography systems make use of a basic magnetic field that is very strong, such as on the order of 3T. This strong basic magnetic field, in turn, has required the use of very high frequencies for the radio-frequency excitation field. The necessity of using such a high frequency excitation field results in a relatively low penetration depth of the excitation field in the patient, so that not all of the desired nuclear spins are “flipped” by the excitation field. In other words, the excitation field in the patient is not uniformly homogenous. The problem of low penetration depth cannot be solved simply by increasing the power of the excitation field, and thereby increasing the penetration depth, because this would over-expose the patient to such high energy radiation, and, at localized regions within the patient , the specific absorption rate (SAR) would be impermissibly exceeded.

This problem is addressed in the method and apparatus disclosed and claimed in the present application by using a whole-body antenna to produce the excitation field in the patient, with the whole-body antenna being composed of a number of resonator segments that are individually activatable. Parameter sets are stored for activating these individual resonator segments and, during the course of a

single excitation of the nuclear spins in the subject in a magnetic resonance pulse sequence, the resonator segments are activated with a number of different ones of these parameter sets. The parameter sets are designed so that when the resonator segments are activated thereby, each set of excitation parameters that is used within a single excitation sequence causes a different phase distribution of the nuclear magnetization distributions in the examination volume, with the nuclear magnetization distributions constructively overlapping to form a homogenous total nuclear magnetization distribution in the examination volume resulting from the single excitation sequence. The parameter sets are also designed to produce local power losses in the patient in the examination volume during the single excitation sequence that are differently situated within the patient, and thus the local power losses do not coincide nor reinforce each other during the excitation sequence.

Therefore, by operating the resonator segments of the whole-body antenna with a number of different parameter sets during a single excitation sequence, not only is the homogeneity of the magnetization distribution in the patient improved, but also this is accomplished without over-exposing the patient (in total) to impermissibly high power losses (heating).

Therefore, in the method and apparatus of the present application, only one antenna is used (namely the whole-body antenna) and this is composed of a number of resonator segments. Additionally, these resonator segments are respectively activated with different parameter sets during a single excitation sequence, to produce the aforementioned result.

The Zhu et al reference, by contrast, makes use of a coil array, that is composed of multiple, individual coils that are intentionally decoupled from each

other. The name “antenna array” is understood by those of ordinary skill in the field of magnetic resonance imaging to refer to a group of individual antennas, and is not considered the same as a whole-body antenna. Even though the whole-body antenna disclosed and claimed in the present application is composed of a number of individual resonator segments, and these individual resonator segments are electromagnetically decoupled from each other (so as to be individually activatable), this is still not the same as an antenna array of the type disclosed in the Zhu et al reference.

In fact, the Zhu et al reference, in paragraph [0042], explicitly contrasts the use of the coil array therein with the use of a body coil.

Moreover, as is the case with any whole-body antenna in magnetic resonance imaging, the antenna excites one excitation region or examination volume, even when a whole-body antenna, as in the subject matter of the present invention, is composed of a number of individual resonator segments. This is in contrast to a coil array, wherein each coil in the array is intended to excite spins in, and acquire magnetic resonance signals from, respectively different volumes, so that a composite image, from the individual images or data sets respectively acquired by the cols in the array, can then be formed. Therefore, each coil in a coil array excites a sub-volume of the total volume from which image data are to be obtained. Moreover, although the cols in the array may be operated with parameters that change from scan repetition-to-scan repetition, each scan repetition includes its own excitation, or excitation sequence. In this excitation sequence, in each scan repetition, the operating parameters of the individual coils in the coil array are not changed. Thus for a single excitation of the examination volume (i.e. an excitation

that occurs in one scan repetition), one and only one set of operating parameters is used for the coils in the coil array in Zhu et al.

Independent claims 1 and 14 have been amended consistent with the above discussion. Although, as noted above, the Zhu et al reference uses the term "body coil" and contrasts that in paragraph [0042] from a coil array, the independent claims of the present application have been amended to make clear that the term "body coil" means a whole-body antenna. It is clear from the specification as originally filed that this is the intended meaning, such as from the illustration shown in Figure 2 and the accompanying description.

Moreover, independent claims 7 and 14 have been amended to make clear that the excitation parameters are varied during a single excitation sequence, as discussed above. This is also clear from the specification as originally filed at numerous locations, such as in the paragraph bridging pages 3 and 4 of the Substitute Specification, as well as in the next paragraph on page 4 of the Substitute Specification.

The Zhu et al reference, therefore, does not disclose all of the elements of independent claims 7 and 14 as arranged and operating in those claims, and thus does not anticipate either of those claims, nor any of the dependent claims depending from independent claim 7.

All claims of the application are therefore submitted to be in condition for allowance, and early reconsideration of the application is respectfully requested.

The Commissioner is hereby authorized to charge any additional fees which may be required, or to credit any overpayment to account No. 501519.

Submitted by,

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